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Atmospheric Chemistry and Physics Discussions

Interactive comment on "A multi-model comparison of meteorological drivers of surface ozone over Europe" *by* Noelia Otero et al.

Anonymous Referee #3

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GENERAL REMARKS

A strong connection exists between air quality - in particular the surface ozone concentration - and accompanying meteorological conditions; hot, sunny, stable conditions favour formation of ozone while turbulent and cloudy condtions are assocoated with low ozone concentrations. It is crucial that air quality models correctly represent this connection. This paper uses data from observations and a number of state-of-science air quality models to investigate this issue. Using simple multiple linear regression models the relationship between ozone and a number of key meteorological quantities is analysed and compared to analogous MLR based on observations. The authors find that model performance varies with variable and geographic region analysed. Model performance with respect to temperature is commonly good while more limited perfor-

mance is found in case of the ozone-relative humidity relationship for all models. It is concluded that model resolution, boundary conditions and the parameterization of ozone dry deposition can have an important impact on model performance in addition to the meteorological variables under investigation.

This paper addresses an important question in air quality modelling. Obviously, if models fail to adequately represent the relationship that exists between meteorology and atmospheric chemistry/composition then air quality assessments and mitigation strategies based on those will be flawed. The use of multi-model datasets and the relatively simple approache of MLR seem appropriate and serve their purpose. Tables and Figures are used appropriately throughout the text and support well the findings. The conclusions drawn at the end are somewhat sparse and limited but interesting and useful. The only real discrepancy that exists in this study is the definition of the spring and summer seasons. I understand that shifting these back by one month may have benefits with respect to the ozone chemistry in the models but springtime is springtime for a good reason. The meteorological variability in springtime (March, April, May) has a profound impact on atmospheric chemistry and so has the comparative stability with its hot, dry and sunny conditions in summer (in general). I am not sure it is such a good idea to give up on the definition of the seasons but I am not going to make this a make-or-break condition for the paper to be published because I can foresee and endless discussion on the pros and cons with potentially little impact on the study at hand.

In my opinion the paper represents an important contribution to understanding model performance and potential discrepancies. However, I do not consider it a scientific milestone. Overall, I have read this manuscript with interest. If some minor issues and typping errors are corrected I believe the paper can be published.

SPECIFIC COMMENTS

L214: something is missing in this sentence after "observed"; please correct.

L217: insert "on" after "meteorological influence".

L271: should read "... defined from a climatology of observational data ..." or "... defined from climatologies of observational data ..."

L272: "including" instead of "included"

L305: "emission densities" instead of "emissions densities"

L352: nothing wrong but IMO the sentence would read more easily this way: "the domains covered by observations and CTMs do not coincide exactly"

L438: better: "... shows ozone peak concentrations in ..." or "... in the EMEP model ozone concentrations peak in April while ..."

L467: "products" instead of "product"

L552: "mentioned" instead of "mentions"

L569-571: it appears to me that these two sentences contradict each other; please clarify.

L617: insert "the" after "While"

L658: "associated with" instead of "associated to"

L667: insert "a" after "show" to read "... observasions show a lower ..."

L698: insert "back" after "brought" to read "... are brought back the following ..."

L718: insert "be" after "partly" to read "... could partly be explained ..."

L722: insert "to" after "attributed" to read "... could be attributed to other ..."

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